MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during September, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i.

On the chart for this month are traced the paths of the centres of seven cyclonic areas; the average number for September during the last thirteen years being 9.4. The area described as ii developed great energy during its passage over the Lake region on the 8th and 9th, causing great damage to shipping interests, particularly on the upper lakes; and violent local storms and tornadoes occurred in Indiana, Michigan, and Ohio during the afternoon and evening of the 8th. The area described as number v was the severe hurricane on the Texas coast from the 15th to the 20th, whose centre remained nearly stationary, and which afterwards moved northeasterly along the Atlantic coast until its union with cyclonic area number vi near Eastport, Maine, on the morning of the 23d. This union was one of the remarkable features of the month.

The monthly mean temperatures were about normal in the southern districts east of the Rocky Mountains; they were slightly above the normal in the Rocky Mountain regions and on the Pacific coast; and below the normal from the upper Mississippi River eastward to the Atlantic coast.

In connection with the monthly precipitation, the most important feature is the very large excess over the average in the Gulf States, the rainfall being heaviest on the Texas coast in the vicinity of Galveston, where it amounted to 26.01 inches, or about one-half of the annual average for the last thirteen years. Marked deficiencies occurred in the middle Atlantic states, New England, the upper lake region, and extreme northwest.

The weather over the north Atlantic Ocean during the month was rough and unsettled; but few icebergs were observed in the route of trans-Atlantic steamers.

In the preparation of this REVIEW the following data, received up to October 20, 1885, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and seventeen Canadian stations, as telegraphed to this office; one hundred and seventy-nine monthly journals, one hundred and seventy-three monthly means from the former, and seventeen monthly means from the latter; two hundred and seventy monthly registers from voluntary observers; forty-four monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Georgia, Indiana, Iowa, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for September, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The mean pressure is greatest over the Ohio Valley and middle Atlantic states, and least over the middle and southern Rocky Mountain regions. The isobar for 30.05 incloses the area of greatest pressure; and that for 29.8 incloses the area of least pressure. The highest barometric mean reported from Signal Service stations is 30.08, for Washington City and Norfolk, Virginia; the lowest is 29.79, for Fort Thomas, Arizona.

Compared with the mean pressure for the preceding month, there has been a decrease along the Gulf coast; also in the south Pacific coast region and along the northern boundary of the country from Minnesota westward to the Pacific coast. The largest deficiencies are, as follows: Port Angeles, Washington Territory, .09; Olympia, Washington Territory, and San Diego, California, .07; and Saint Vincent, Minnesota, .06. In all other districts the mean pressure is greater than for August, the excess ranging from .05 to .10 over the central Rocky Mountain districts, and over the greater part of the country to the east of the Mississippi River and north of the thirty-fifth parallel.

The departures from the normal pressure at the various Signal Service stations are given in the table of miscellaneous meteorological data, and on chart iv they are exhibited by lines connecting stations of equal departure. The mean pressure for September, 1885, is normal, or slightly above the normal, over the central Ohio valley and portions of the middle and south Atlantic states; it is also normal or above at scattering stations in the middle and southern Rocky Mountain regions. In all other districts the mean pressure is below the normal. The deficiencies nowhere exceed .09, and except in the Gulf States, north and south Pacific coast regions, at Mackinaw City, Michigan, and Eastport, Maine, where they range from .05 to .09, they are less than .05.

MONTHLY BAROMETRIC RANGES.

The monthly barometric ranges at Signal Service stations are also shown in the table of miscellaneous meteorological data. They were greatest in New England, and least over the southern parts of the country. The greatest and least monthly ranges are, respectively, 1.61, at Eastport, Maine, and .18, at Brownsville, Texas.

ANTI-CYCLONIC AREAS.

Seven of these areas crossed the country during the month; all, except numbers iii and vii, appeared first in the north Pacific coast region and crossed the mountains; all preserved the usual course, and only one, number vi, exhibited very great energy.

I.—This area was anti-cyclonic area number viii of the month of August; it was central in the Missouri Valley on the morning of the 1st, at which time light frosts were reported as having occurred in Dakota and Minnesota during the previous night. Generally fair weather prevailed during the 1st in all districts, except in the lower lake region, where light rains fell. Local rains also fell in South Carolina, Georgia, Arkansas, Missouri, and Illinois. Fresh westerly winds prevailed on the lower lakes and on the New Jersey coast on the same day. By the morning of the 2d this area had moved southeasterly and had embraced all the Atlantic coast states except Maine. On the morning of the 2d light frosts were reported in the Lake regions, but no particular damage resulted; and on the morning of the 3d light frosts occurred in New England. By this time this area commenced moving northeasterly with diminishing intensity. By midnight of the 3d the winds had shifted to southerly on the Atlantic coast, and local rains occurred in Virginia, on the Gulf coast, in Illinois, and in the Missouri Valley. The temperature rose during the 3d in all districts east of the Mississippi River.

II.—This area appeared in Washington Territory on the 1st and moved easterly to Montana, where it remained nearly stationary until the morning of the 4th; by the afternoon of this day the pressure had increased in Dakota and Montana, and there was quite a decided fall of temperature in Kansas, Colorado, Wyoming, and Montana. By the morning of the 5th this area was central in northern Dakota, and had gradually extended so as to cover the upper Mississippi and Missouri valleys as well as the states and territories just mentioned above, and frosts were reported as having occurred in the upper lake region and in the northern parts of the upper Mississippi and Missouri valleys. By the morning of the 6th this area had covered the lake regions and had extended to the Atlantic coast, with generally fair weather in all districts east of the Missouri Valley and north of North Carolina and Tennessee. On the morning of the 6th light frosts were reported in the upper lake region. By the morning of the 7th this area was central over New England, with the pressure from .10 to .16 above the normal. From this time the pressure gradually diminished. This area in its progress across the country was accompanied by the usual anti-cyclonic conditions. High winds prevailed on the Atlantic coast from Hatteras, North Carolina, to Block Island, Rhode Island, on the 5th and 6th under the influence of this area. On the 7th and 8th this area was diminishing in intensity.

III.—This area was first apparent on the afternoon of the 9th over Lake Superior, where it remained, without any special change, until the morning of the 10th, when the pressure had increased to about .10 above the normal. This area followed cyclonic area number ii, and produced clearing weather and fresh northeasterly winds on Lakes Erie and Ontario. By the morning of the 11th this area was central near Albany, New York, and the weather was generally fair, with nearly stationary temperature over the country east of the Missouri Valley, including also the Gulf States. On the Atlantic coast, on this date, fresh northeasterly winds prevailed. By the morning of the 12th this area was disappearing off the Atlantic coast, followed by cyclonic area number iii. The morning of the 13th showed this area still on the coast, with the pressure very near the normal.

IV.—This area appeared in the north Pacific coast region on the 13th, where, in the afternoon reports, there was shown a rise of .30 in twenty-four hours. By the morning of the 14th it had moved across the Rocky Mountains and was central in Montana, and extended to the Missouri Valley. By the morning of the 15th it was central in the Missouri Valley, with the pressure about .10 to .12 above the normal, and fair weather in all districts east of the Rocky Mountains, except in Texas, where there was considerable rain, accompanied by thunder. By the morning of the 16th this area had moved eastward and was central over the upper lake region. On this day the weather was generally fair and the winds were fresh northerly on the Atlantic coast. This area was attended by a fall of temperature of about ten degrees, but no decided cool wave. During the 18th and 19th this area remained on the Atlantic coast, but with decreasing intensity. By the afternoon of the 19th the winds had generally shifted to easterly in the south Atlantic and Gulf States, where abundant rains fell, particularly on the coast.

V.—This area appeared on the morning of the 16th in the north Pacific coast region, following cyclonic area number iv. By the morning of the 17th it had moved eastward and was central in the Missouri Valley, with a sudden rise of .40 in the twenty-four hours. At this time anti-cyclonic area number iv was resting over the middle Atlantic states. By the morning of the 19th these two areas seem to have joined, and covered the Lake regions, the Ohio Valley, and the middle Atlantic states. On the morning of the 20th this area covered the lower lake region, New England, and the middle Atlantic states, and was central near Ottawa, Province of Ontario, with the pressure there .30 above the normal; generally fair weather, with light, variable winds, prevailed throughout these districts. By the morning of the 21st this area was central over Nova Scotia, with an increase of pressure of about .15, and generally fair weather in all northern sections of the country. This area was followed by rapidly falling barometer, and cyclonic area numbers v and vi, the former from the west Gulf coast and the latter from the British Northwest Territory.

VI.—This area made its appearance in the north Pacific coast region on the morning of the 19th, but was not very definitely formed until the afternoon of the 21st, by which time it had spread over Montana and Wyoming, although still central over Washington Territory. By the morning of the 22d it had moved eastward and covered the Missouri Valley, and was central in Manitoba, with the pressure .25 above the normal. The pressure had risen rapidly after cyclonic areas numbers v and vi, particularly in the Lake regions, where, during the 22d, high northerly winds prevailed. This area was accompanied by quite a decided cold wave, the temperature falling from 20° to 30° in all northern districts. This area spread gradually eastward but the centre seemed to take a southeasterly course until the morning of the 24th, when it rested in Virginia. On this date frosts were reported in nearly all northern districts, but they were quite light, and ample warning had been given, so that little damage was reported to have resulted. By the morning of the 26th this area was central over Nova Scotia, having taken a northeasterly direction. During the 25th the barometer had risen very rapidly, the afternoon charts showing a rise of from .30 to .70 over New England and the Canadian Maritime Provinces. From the 26th to the 29th the pressure gradually decreased and generally fair weather, with slowly rising temperature, prevailed in all northern districts. This area, in conjunction with cyclonic areas numbers v and vi after their union on the 23d, produced high northwesterly winds on the Atlantic coast, all during the 23d.

VII.—This area was first apparent in the British Northwest Territory on the afternoon of the 28th. It moved easterly until the afternoon of the 30th, when it was central in the northern part of Minnesota. By midnight it was central north of Lake Superior; it produced no very decided changes in temperature, but abundant rains fell on the 29th and 30th in the upper Mississippi and Ohio valleys and in Tennessee, due, doubtless, to its influence.

CYCLONIC AREAS.

I.—This area was first noticeable on the afternoon charts of the 1st in Manitoba and the Northwest, where there was an abnormal fall of the barometer of .10; the centre could not be very definitely located at that time, but at midnight it seemed to be a little north of Minnedosa, Northwest Territory. By midnight of the 2d it was central over Lake Superior; at this time winds of considerable violence were experienced on the upper lakes, velocities of thirty miles at Escanaba, Michigan, and twenty-five miles at Marquette, Michigan, being reported. By the afternoon of the 3d the centre was north of Ottawa,

Province of Ontario, and in its progress eastward light rains had fallen in the Lake regions. By the morning of the 4th the centre was well to the north of Father Point, Province of Quebec; rains continued during the 4th in the lower lake region and in the Ohio Valley; these seemed to be particularly due to anti-cyclonic area number ii, which followed rapidly, bringing cooler northwesterly winds in these districts.

II.—This area commenced to be noticeable on the morning of the 5th by a general fall of the barometer in the Pacific coast districts, but it did not take definite shape until the morning of the 7th, when it was a well-developed storm in Colorado, Kansas, and Nebraska, and was central near West Las Animas, Colorado. Up to this time the weather had been controlled by two anti-cyclonic areas; cyclonic area number i having passed so far to the north as to have had little effect except in the Lake regions. On the afternoon of the 7th heavy rains fell in the Missouri Valley, the following being reported in the eight hours: Lamar, Missouri, 6.10 inches; Leavenworth, Kansas, 2.08 inches. The storm-centre at this time was a little to the northwest of Dodge City, Kansas, with the barometer slowly falling, and at Dodge City .27 below the normal. By the morning of the 8th the centre was just east of Des Moines, Iowa, where the barometer was .63 below the normal, the fall in the twenty-four hours having been .69. At this time high winds were reported on Lake Michigan and heavy rainfall in the upper Mississippi valley. The rain-area was almost a circle, one axis extending from Cleveland, Ohio, to North Platte, Nebraska, and another from Memphis, Tennessee, to Moorhead, Minnesota. By midnight of the 8th the centre was over Lake Michigan, and the rain-area had reached the Atlantic coast, where fresh southerly winds prevailed. Storm signals were ordered on the Lakes, and were far enough in advance to be of great benefit, although considerable damage was done to shipping. By the morning of the 9th the centre of the storm was over the southern part of Lake Huron; by the afternoon it had moved east-southeast to about Albany, New York, and by midnight was on the southeast coast of Massachusetts. During the day severe gales occurred on the lower lakes and during the night on the Atlantic coast from Cape Henry, Virginia, to Boston, Massachusetts. The influence of the storm was still felt on the 10th, the winds on the coast generally shifting to fresh northwesterly. From this point this storm is described under "North Atlantic storms," as number 5, in this REVIEW.

III.—This area also came from the Pacific coast and took definite form in southeast Colorado on the afternoon of the 10th, with the barometer .23 below the normal. By the afternoon of the 11th the isobar for 29.5, inclosing the storm centre, was quite a long oval extending from Huron, Dakota, nearly to Santa Fé, New Mexico. By the morning of the 12th the centre had moved northeasterly and was near Duluth, Minnesota, where a heavy rain, 1.78 inches, had fallen in the preceding eight hours. Rain had fallen generally in the upper Mississippi and Missouri valleys. On the afternoon of the 12th the centre was north of Duluth, Minnesota, and west of Prince Arthur's Landing, Province of Ontario. The gradient to the southeast of the centre was steep, and fresh southerly winds prevailed in the Lake regions. From this time until the afternoon of the 13th the centre described an abnormal track, making a loop in Manitoba. By the morning of the 14th it had moved easterly and was a little north of Prince Arthur's Landing, Province of Ontario. During the 13th rain had generally fallen in the Lake regions and in the Ohio Valley. During the 14th the path described by the storm-centre was normal, and on the morning of the 15th the centre was north of Father Point, Province of Quebec. During the 14th fresh south to west winds prevailed on the Atlantic coast, and westerly winds over the Lake regions.

IV.—This area came from the north Pacific coast region, and on the afternoon of the 15th was central north of Fort Custer, Montana. By the morning of the 17th the centre had moved in a direction slightly north of east and was north of Lake Superior. But slight energy was manifested by this storm, and by midnight the centre had moved northeasterly out of the limits of the Canadian stations; light rains fell in the Lake regions and in the Canadian Provinces.

V.—This storm raged on the Texas coast from the 15th to the 20th. The meteorological conditions over the country on the morning of the 15th were as follows: Anti-cyclonic area number iv was central in the Missouri Valley, and generally fair weather prevailed in all districts except in the west Gulf states. The winds were northeasterly on the Texas coast, and rain had fallen during the night of the 14th, and a thunderstorm, with light rain, was reported at Galveston, Texas. The barometer was very near the normal on the coast. By the afternoon of the 15th the wind was due east at both Galveston and Indianola, Texas, and northeast at Rio Grande City, Texas, indicating that the centre of the cyclone was somewhere to the south of these places; a maximum velocity of thirty-two miles was recorded at Indianola, Texas. By the morning of the 16th the rain-area had extended to New Orleans and Shreveport, Louisiana, and the winds were fresh northeasterly in the west Gulf states. This stormy weather continued until the morning of the 18th, when the storm-centre was pretty definitely located southeast of Indianola, Texas, and northeast of Rio Grande City, Texas. The storm-centre moved slowly northeasterly until the afternoon of the 20th. In the next twenty-four hours it had passed easterly across northern Florida and southern Georgia, and in the afternoon was southeast of Savannah, Georgia. This storm was the most protracted and the greatest rain storm in the record of the Galveston signal office, or within the memory of any resident of the city. The bark "Orient," with all her crew, four men and a boy, was lost at the entrance of the harbor on the 18th. The following table and note, taken from a carefully written special report of the observer at Galveston, gives the main features of this remarkable storm.

For twenty-four hours ending at 11 p. m.	Wind.			Mean daily barometer.	Daily rainfall.
	Max. velocity.	Total movement.	Prevailing direction.		
	Miles.	*Miles.*		*Inches.*	*Inches.*
September 15	15	200	e.	29.985	1.51
16	20	266	ne.	29.943	3.20
17	22	250	se.	29.977	1.90
18	30	560	e.	29.952	2.26
19	34	583	e.	29.874	3.39
20	35	401	ne.	29.854	4.27

NOTE.—Highest velocity during the storm, 35 miles; total movement of wind, 2,340 miles; highest barometer, 30.019, on the 15th; lowest barometer, 29.823, on the 20th; range of barometer during the storm, 0.196; total rainfall, 16.53 inches.

At Indianola the same condition of affairs existed as at Galveston during the same period of time, and quite a panic prevailed on the 19th. The wind attained a maximum velocity of sixty miles per hour, and 2.44 inches of rain fell during the day. The barometer was only .21 below the normal. High tides were reported on the 17th, 18th, and 19th. By the morning of the 20th all danger was considered past.

On the 20th rain fell generally in the east Gulf and south Atlantic states. On the 20th and 21st heavy rain fell at Smithville, North Carolina, Charleston, South Carolina, Savannah, Georgia, Jacksonville, Florida, and New Orleans, Louisiana. During the night of the 21st and during the 22d this area moved northeasterly along the coast, causing fresh gales. At midnight of the 22d the centre was southeast of Block Island, Rhode Island, where the barometer was .78 below the normal; an abnormal fall of .80 occurred in twenty-four hours. On the morning of the 23d the centre of this area and that of number vi came together near Eastport, Maine, where the barometer was 1.29 below the normal.

VI.—This area appeared in Manitoba upon the midnight chart of the 20th; by midnight of the 21st it had moved easterly and was central over the eastern end of Lake Superior; on the afternoon the centre was near Ottawa, Province of

Ontario, and up to this time no rain had fallen within the storm-area, but high gales occurred in the Lake regions. On the afternoon of the 22d rain fell in the lower lake region, and thunder-storms were reported. At midnight the centre was about midway between Father Point and Quebec, Province of Quebec; the pressure was about .60 below the normal. The gradient was steep from Marquette, Michigan, (30.10) to Father Point, Province of Quebec, (29.40). The barometer was lowest at the centre of area number v, which at this time was off Block Island, Rhode Island, and the barometer was 29.28. During the night of the 22–23d the storm was very severe on the New England coast. On the morning of the 23d the isobars were crowded together from Eastport, Maine, (28.80) to Rochester, New York, (29.82). Very high northwesterly gales prevailed on the Atlantic coast from Hatteras, North Carolina, to Portland, Maine, and on the lower lakes. On this day several lives were lost off the coast of Maine and considerable damage to shipping was reported; but the cautionary signal was displayed long enough in advance of the storm to be of benefit, and the display was favorably commented upon. By midnight of the 23d the storm-centre had moved northerly and was near Anticosti, Province of Quebec. On the 24th the centre was north of the Gulf of Saint Lawrence, and the barometer commenced to rise rapidly.

VII.—This area appeared to be central south of Mobile, Alabama, at midnight of the 24th. On the morning of the 26th a severe storm was in progress on the coast, with strong northeasterly winds at Mobile, Alabama, Pensacola, Florida, and New Orleans, Louisiana, and heavy rains fell at these places during the night. The centre seemed to remain nearly stationary until the morning of the 28th, and during the five days, from the 24th to 28th, the rain was almost continuous. By the morning of the 29th the centre was between Pensacola and Cedar Keys, Florida; fresh easterly winds and heavy rains were reported on the 28th and 29th on the south Atlantic and east Gulf coasts. On the morning of the 30th the centre was near Jacksonville, Florida, and by midnight the centre had passed easterly off the coast nearly over Jacksonville, Florida. Fresh northeasterly winds prevailed during the day on the south Atlantic coast. The storm was not of very great violence, although the rains were very heavy; and the barometer ranged about .30 below the normal.

The following table gives the latitude and longitude in which each area was first and last located, and the average hourly velocity:

Cyclonic areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	50 45	100 00	51 15	64 30	26.9
II	38 15	103 30	41 30	70 15	28.8
III	37 45	103 45	51 00	68 00	30.4
IV	46 30	110 00	51 00	84 00	26.7
V*	22 30	96 30	50 30	61 00	18.6
VI*	51 15	101 30	50 30	61 00	28.8
VII	28 15	88 15	30 45	81 15	4.5
Mean hourly velocity					23.5

* Centres united in N. 45°, W. 68°.

NORTH ATLANTIC STORMS DURING SEPTEMBER, 1885.

[*Pressure expressed in inches and millimetres; wind-force by scale of* 0-10.]

The paths of the atmospheric disturbances that have appeared over the north Atlantic Ocean have been determined, approximately, from international simultaneous reports furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and reports collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data received at this office up to October 22, 1885.

Of the twelve depressions shown on the chart, two, viz., numbers 5 and 7, were continuations of storms which had previously traversed the North American continent; two, numbers 2 and 4, were first observed over the northern part of the Gulf of Saint Lawrence, and three (3, 8, and 10) over Newfoundland and the Banks. Numbers 1, 6, and 11 appeared over the region east of the thirty-fifth meridian, the second being a somewhat severe storm which developed suddenly near the mouth of the English Channel. Number 9 was a hurricane which appeared within the tropics, and number 12 was a cyclonic storm of considerable energy which occurred near N. 40°, W. 60° during the closing days of the month. The data referring to these storms are incomplete, the paths of the storm-centres cannot, therefore, be determined at present.

The weather over the north Atlantic during September, 1885, was generally stormy and unsettled, especially over the region east of the fortieth meridian, with frequent marked fluctuations of the barometer, and moderate to strong gales, mostly from sw. to nw.

1.—This disturbance was shown near N. 50°, W. 25° on the 1st. On that day the reports from vessels between N. 47° and 50° and W. 15° and 30° indicated pressures ranging from 29.5 (749.3) to 29.75 (755.6), with strong winds to fresh gales from sw. to w. and n., while vessels to the northward of the fiftieth parallel had strong breezes to moderate gales from s. to e. and ne. The s. s. "Wisconsin," E. Bentley, commanding, had a strong breeze, with rain, at 8 a. m., of the 1st; wind veering to n., ne., and se. at noon, and then backing to e. at 2 p. m.; ne. at 6 p. m., and to n. at midnight, blowing a fresh gale. The lowest barometer, 29.64 (752.8), was observed at noon on the 1st, in N. 51° 12′, W. 24° 58′, remaining stationary at that value for about six hours. During the 2d and 3d the depression moved northeastward, with decreasing pressure, and on the last-mentioned date it was central near the Irish coast, with pressure about 29.25 (742.9). During the above dates strong gales from sw. to nw. occurred over the ocean westward to about the twenty-fifth meridian.

2.—This disturbance moved over the northern part of the Gulf of Saint Lawrence during the 2d, and on the morning of the 3d it was apparently central near the Strait of Belle Isle, with pressure about 29.2 (741.7). On the 4th the region of least pressure was near N. 53°, W. 38°, where the barometer read 29.4 (746.7); slight gradients existed over the ocean between W. 50° and the British Isles, and consequently the winds were moderate in force, not exceeding force 6 of the scale during the 4th. On the 5th, however, as the disturbance moved eastward with slightly decreased pressure, about 29.3 (744.2), near N. 53°, W. 28°, occasional w. and nw. gales of force 8 were reported to the southward and westward of the centre. On the 6th the centre of depression was near N. 52°, W. 15°, barometer 29.45 (748.0), with moderate to strong winds from s. to w. and n. On the following day the depression apparently passed over the British Isles.

3.—This depression appeared over the eastern part of the Gulf of Saint Lawrence on the 6th, on which date the centre of disturbance was apparently in Newfoundland, while strong wsw. and sw. winds and heavy rain, with barometer ranging from 29.6 (751.8) to 29.75 (755.6), were reported over the ocean between W. 50° and 55°. By the 7th the storm-centre had moved northeastward to about N. 52°, W. 38°, whe e the barometer ranged from 29.15 (740.4) to 29.35 (745.5), and moderate to strong gales from w. and sw. prevailed over the region between N. 45° and 50° and W. 30° and 40°. On the 8th the disturbance was shown near N. 55° and between W. 20° and 25°, the barometric readings to the southward of the above-mentioned parallel ranging from 29.6 (751.8) to about 29.85 (758.2) near N. 49°, while sw. and w. gales of force 7 to 8 continued between W. 20° and 30°. By the 9th the disturbance was apparently off the northwestern coast of Scotland.

4.—This was a slight depression which apparently passed off the Labrador coast on the 9th; as it moved eastward over the ocean a considerable decrease of pressure appears to have

occurred, and the area of disturbance increased in size, the barometer on the 10th, near N. 55°, W. 45°, falling to 29.3 (744.2) with strong s., sw., and w. gales over the ocean southward to the forty-fifth parallel. During the 11th and 12th this depression moved eastward north of the fifty-fifth parallel, with barometer on the former date about 29.1 (739.1), and falling on the latter date to 28.9 (734.0), when the storm-centre was near N. 56°, W. 15°; on those dates vessels between W. 35° and 15°, and to the northward of N. 50° reported strong wsw. to w. gales. On the 13th this disturbance passed to the northward of the British Isles.

5.—This was a continuation of the disturbance described as number ii, under "Cyclonic areas," in this REVIEW. After passing off the New England coast on the afternoon of the 9th, it moved northeastward, and on the 10th the centre of depression was near the southern coast of Newfoundland, where the lowest reported barometer reading was 29.5 (749.3), and strong ssw. winds to moderate sw. gales prevailed over the ocean to the eastward. On the 11th the centre of this depression was shown near N. 47°, W. 38°; the pressure varying from 29.25 (742.9) to 29.35 (745.5), with moderate s. to e. gales in the eastern, and very heavy n. and nw. gales in the western, semicircle of the depression. During the 11th the disturbance appears to have moved northeastward, passing beyond the fiftieth parallel, and on the 13th it was to the northward of N. 55° and between W. 15° and 20°, over which region the barometer remained low for several days. This depression, together with number 4, which moved at a higher latitude, caused a period of very unsettled, stormy weather over the Atlantic; trans-Atlantic steamers bound to the westward encountered first the westerly gales which prevailed in the southern quadrants of depression number 4, and then the ssw. to sw. and w. gales accompanying the second disturbance.

6.—This was a deep depression which appears to have formed near the mouth of the English Channel on the evening of the 10th, as indicated by the report of the s. s. "Salerno," B. H. Rogers, commanding; on the 10th at 10 p. m. that vessel encountered a strong gale, increasing to hurricane force from ssw., and shifting to w, and thence to n. and nne.; the lowest barometer observed (aneroid, corrected) was 28.89 (733.8), at 11 p. m. of the 10th, in N. 49° 38′, W. 7° 20′; the gale continued until 5 a. m. of the 11th.

Captain S. Wohlmuth, commanding the bark "Betty," reported at noon of the 10th, in N. 49° 53′, W. 4° 30°, barometer, 29.82 (757.4), wind hauling from ssw. to southerly and easterly; 2 p. m., light, drizzling rain, wind freshening; 4 p. m., strong sse. breeze, coming sometimes in puffs, barometer falling steadily and rapidly from .10 to .15 inch per hour, raining in torrents, wind increasing and hauling to se. At 6 p. m. sudden calm, and a quarter of an hour later it blew still harder than before from se.; at 7 p. m. it again fell light, and a heavy easterly swell was experienced; 7.30 p. m., clearing, sighted Lizard Lights nne., about 8 miles distant. At 8 p. m., barometer 29.19 (741.4), still falling; 8.30 p. m., wind nw., light for fifteen minutes, and occasionally going to n. and nne., then it came suddenly from nnw., blowing with hurricane force and accompanied by heavy rain. At this time, the foresail, foretopsail, and foretopmast staysail were blown away; the barometer had risen from 29.16 (740.7), the lowest observed, at a few minutes past 8, to 29.29 (744.0). The wind continued to blow a heavy gale until 11 p. m., when it began to decrease and the barometer rose rapidly.

7.—This was probably a continuation of the disturbance described as number iii under "Cyclonic areas." On the 16th it was central near the Strait of Belle Isle, whence it passed east-northeastward, and by the 17th was shown near N. 54°, W. 35°, with pressure about 29.5 (749.3), and attended by fresh gales from wsw. and w. over the ocean southward to the fiftieth parallel. It moved eastward near the fifty-fifth parallel until the 18th, when it passed northeastward north of the British Isles.

8.—This was a slight depression which formed near the southern edge of the Banks on the 17th; it was accompanied by fresh gales from se. to sw., the pressure in the vicinity of the centre being about 29.65 (753.1) During the day it moved northeastward and apparently became merged in number 7.

9.—This was a hurricane which developed within the tropics on the 18th; the only data relative thereto, as yet to hand, are the following, and are insufficient to determine the path of the hurricane:

Captain W. H. Stapledon, commanding the s. s. "Sirius," bound from Rio de Janeiro to New York, reported: "At 6 p. m. on September 18th the wind backed from nne. to nnw., strong and squally, with heavy, irregular sea, wind increasing at midnight to a strong gale, with heavy squalls from nw.; lowest barometer (aneroid, corrected), 29.5 (749.3), at 10 p. m. of the 18th, in N. 17° 33′, W. 56° 4′. At 6 a. m. of the 19th, moderate ssw. gale, with high, irregular sea, and nothing visible above two hundred yards from the ship but white mist, which continued until the disturbance was past. Morning of the 20th, strong gale and high, irregular sea, with furious squalls and continuous heavy rain; 2 p. m. of the same date, gale moderating; 8 p. m., wind lulled, followed by sudden and violent gusts from w. to sse.; at midnight, strong sse. gale and heavy rain; ship laboring heavily and shipping immense quantities of water. September 21st, 8 a. m. (no position given), blowing a hurricane with heavy rain, barometer 29.7 (754.4), high, irregular sea from sw., sse., and se.; weather thick and misty, and continuing without abatement until midnight of the 21st, when it settled down to a moderate gale from se. by e."

Captain P. J. Fraser, commanding the s. s. "Flamborough," reported that on the 18th, when passing out by Sombrero (Windward Islands), he experienced strong ene. trades and a very heavy se. sea, which continued until the 23d.

The ship "Tsernogora," A. Cann, commanding, in N. 26° 10′, W. 63° 36′, had barometer (aneroid, error unknown) 29.98 (761.5), wind n. 80° e., force 5, with heavy showers of rain, long and heavy, rolling sea from se.; the barometer had steadily fallen from 30.17 (766.3) on the 17th, in N. 20° 08′, W. 56° 5′; the wind also having shifted from se. to ne.

Captain J. S. Garvin, commanding the s. s. "Orinoco," at Bermuda, reported that on the 20th a very heavy sea from se. began to roll in on the beach and continued until the evening of the 22d.

10.—This was a slight depression which appeared on the 20th; it moved rapidly northeastward without manifesting any great storm-energy, and during the 21st it apparently filled in over mid-ocean. During its passage the barometer ranged from 29.6 (751.8) to 29.7 (754.4).

The disturbance which moved northeastward along the coast of the United States during the 21st, 22d, and 23d (number v of "Cyclonic areas"), caused very stormy weather at sea; during those dates vessels between N. 30° and 40° and to the westward of the seventy-second meridian had furious gales from e. to ne., n, and nw., with barometer ranging from 29.3 (744.2) to 29.5 (749.2). On the 23d vessels to the northward of N. 40° and near W. 69°, had barometer below 29.0 (733.6). The brig "Erma," J. Neill, commanding, reported barometer 28.80 (731.5) at 12.20 p. m. of the 23d, in N. 42°, W. 69°; furious ne. gale, in which sails were blown away and the vessel sustained considerable damage. The s. s. "Suevia," C. Ludwig, commanding, at 1 a. m. of the 23d, in about N. 41°, W. 70°, had barometer down to 28.74 (730.0), with a strong gale from nw. for half an hour, when it decreased to a moderate gale and the barometer began to rise slowly. Vessels between W. 57° and 67° and north of 40° N., had strong gales from se. to sw., with barometer readings ranging from 29.2 (741.7) to 29.5 (749.3).

The s. s. "Camden," S. R. Chandler, commanding, encountered this storm during its passage over the Gulf of Saint Lawrence; Captain Chandler reported at 8 a. m. of the 23d (Greenwich date and hour), wind se., freshening rapidly, weather cloudy and rainy, and barometer falling; noon (posi-

tion, by account, being ten miles nne. from Bird Rocks), wind se., force 10, with furious squalls of rain, barometer (aneroid, error unknown) 29.7 (754.4), and falling rapidly; 4 p. m., same weather, wind occasionally falling light, barometer 29.41 (747.0); 8 p. m., wind blowing with great fury; 9 p. m., barometer reached its lowest, 29.15 (740.4), after which the wind and sea began to moderate; midnight, wind veering to southward, weather foggy, barometer 29.31 (744.5). At 8 a. m. of the 24th sighted Saint Paul's Island, barometer 29.52 (749.8), wind hauling to sw.

11.—This depression appeared north of the fifty-fifth parallel and east of the thirty-fifth meridian on the 27th. It apparently moved slowly in a southeasterly direction until the 29th, when the area of disturbance extended to the fiftieth parallel, and on the 30th the region of least pressure was near the northwestern coast of the British Isles. During the passage of this disturbance the barometer ranged from 29.4 (746.7) to 29.7 (754.4), and strong gales from ssw., sw., w., and nw. prevailed over the ocean between W. 40° and the British coasts and as far south as the forty-ninth parallel.

12.—A deep depression, showing considerable storm-energy, appears to have existed between N. 35° and 40° and W. 60° and 65° on the 28th and 29th; the data as yet to hand are insufficient to determine its origin and subsequent course, the following reports, however, indicate its presence over the region above-mentioned:

Captain Delap, commanding the bark "Mistletoe," reported as follows: "28th, strong gale from ne., heavy rains, and a long, heavy swell from sse., barometer gradually falling—at noon, Greenwich time, of the 28th, in N. 42° 30′, W. 60° 20′, barometer (aneroid, corrected) read 29.85 (758.2), wind ne., force 9—every appearance of a heavy storm; ran the ship w. by s., true, keeping the wind two to three points on the starboard quarter; at midnight (morning of the 29th) wind commenced to gradually haul to the northward; kept the wind three to four points on the starboard quarter; blowing with tremendous force, ship under reefed foresail; very heavy swell from east. Concluding that I was on the nw. edge of a cyclone, I ran the ship until 8 a. m. (ship's time), the wind being then nw. by n., with very high and cross sea. I then hove-to on the port tack, as I concluded that the centre was to the eastward. The barometer fell to 29.11 (739.4), the wind blowing with hurricane force, and accompanied by torrents of rain; the wind gradually hauled to w. at noon, ship's time, when it cleared up and the barometer began to rise; the heavy easterly swell continued from 4 p. m., ship's time, until the 30th." At noon, Greenwich time, of the 29th the barometer read 29.21 (741.9), wind nw., force 10, the ship's position being N. 39° 32′, W. 62° 15′.

The s. s. "Warwick," C. F. Lobbett, commanding, had a strong easterly gale on the 28th, increasing to a whole gale from ne. by evening of the 29th, with very heavy sea from se. The lowest barometer was 29.77 (756.1), at 8 a. m. of the 29th, in N. 41° 55′, W. 62° 0′, the wind shifting to ne. about the time of lowest barometer.

OCEAN ICE.

On chart i are also shown the eastern and southern limits of the region within which icebergs were observed during September, 1885. These limits are determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers.

The easternmost icebergs were observed between the meridians of 46° and 47° W; and the southernmost bergs between the parallels of 45° and 46° N. They were few in number, and were mostly of small dimensions.

Compared with the chart for the preceding month (August, 1885), there is a difference of about four degrees of longitude in the positions of the eastern limits, that for the present month being about 4° west of that for August. The southern limit is about 2° north of that for the preceding month.

The following is a comparison between September, 1885, and the same month in the three preceding years:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
September, 1882	.....	.....	September, 1882	.....	.....
September, 1883	48 25	47 10	September, 1883	49 01	44 33
September, 1884	46 06	53 21	September, 1884	47 39	49 14
September, 1885	45 40	48 22	September, 1885	48 40	46 27

Icebergs were reported as follows:

September 1st.—S. S. "Elbe," in N. 46° 9′, W. 47° 5′, passed an iceberg at 5.30 p. m.; also passed another at 5.52 p. m., in N. 46° 7′, W. 47° 12′.

2d.—S. S. "Germanic," in N. 46° 0′, W. 47° 40′, passed five pieces of ice; s. s. "Holland," in N. 45° 51′, W. 47° 48′, passed a small iceberg.

13th.—Bark "Iodine," in N. 51° 0′, W. 50° 36′, passed two large icebergs.

19th.—S. S. "Hibernian," in N. 48° 20′, W. 47° 46′, passed two small icebergs.

21st.—S. S. "Neckar," in N. 47° 22′, W. 46° 54′, passed four icebergs, the largest being about one hundred feet high; temperature of air, 57°.2; water, 51°.8. The s. s. 'City of Chicago," in N. 47° 38′, W. 46° 44′, passed two large icebergs and some small pieces.

23d.—S. S. "Europa," in N. 47° 10′, W. 47° 15′, passed two icebergs; s. s. "British Prince," in N. 47° 14′, W. 46° 57′, passed three icebergs; s. s. "Adriatic," in N. 47° 11′, W. 46° 40′, at 5.45 a. m., passed a medium-sized iceberg and two small pieces near it.

25th.—S. S. "Nymphœa," in N. 48° 10′, W. 47° 14′, passed a large iceberg; s. s. "Amérique," in N. 48° 20′, W. 47° 18′, at 5 p. m., passed an iceberg.

26th.—S. S. "Jersey City," in N. 45° 40′, W. 48° 22′, passed a large iceberg.

29th.—S. S. "Norseman," in N. 48° 40′, W. 46° 27′, passed an iceberg about four hundred feet long and ninety feet high.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during September, 1885, four reports concerning storms and icebergs encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada for September, 1885, is exhibited on chart ii by the dotted isothermal lines; and in the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

In the Gulf States, Rio Grande Valley, Tennessee, extreme northwest, upper Mississippi and Missouri valleys, and middle slope, the mean temperature for September, 1885, has differed but slightly from the normal; the departures in these districts, as shown in the above table, average less than 1°. In the Lake region, Ohio Valley, and on the Atlantic coast, the month has been colder than the average September, the departures from the normal temperature being most marked in the lower lake region and New England, where the average departures, for the districts, were 2°.3 and 2°.9, respectively. In the northern slope, the plateau districts, and on the Pacific coast, the mean temperatures were above the normal, the departures being greatest in the northern slope, north Pacific coast region, and in the northern and southern plateau districts. The following are the most marked departures occurring at Signal